

GOVERNMENT/INDUSTRY AERONAUTICAL CHARTING FORUM

Instrument Procedures Subgroup (Originally presented at ACF 92-02) RECOMMENDATION DOCUMENT

FAA Control # 92-02-104

SUBJECT: TERPS Paragraph 323a, Precipitous Terrain Additives

BACKGROUND/DISCUSSION: The drafters of the TERPS criteria intended that the nominal obstacle clearance in the segments of approach procedures be increased when significant precipitous terrain underlies any of the approach segments. The language contained in TERPS 323a is vague which has resulted in the general failure of the FAA to make allowances for precipitous terrain where such additives will adversely affect minimums. Two cases in point are the LOC/DME RWY 28L SIAP at Monterey, California and two procedures that approach Medford, Oregon from the south. At these locations terrain located within the primary areas of the intermediate segments is several thousand feet higher than the airport elevation yet the FAA field offices have subjectively disregarded the precipitous characteristics of the terrain.

RECOMMENDATION: TERPS 323a and related approach-segment-specific language should be revised to provide comprehensive and objective parameters for the application of precipitous terrain additives. Pending such revisions, the procedures at Monterey and Medford should forthwith be revised to include conservative precipitous terrain additives. Additionally, the FAA should expeditiously review all procedures that are known to have terrain significantly higher than the airport that underlies initial or intermediate approach segments.

COMMENT: This recommendation affects the United States Standard for Terminal Instrument Procedures (TERPS), FAA Order 8260.3B.

Submitted by: Charles K. Guy,
May 13, 1992

AIR LINE PILOTS ASSOCIATION

INITIAL DISCUSSION (Meeting 92-02): Records of the initial discussion and minutes of meetings 93-01 through 94-02 are not available.

MEETING 95-01: Remote Altimeter Setting Source (RASS) in precipitous terrain formula (.14 x elevation differential) is a recent change to RASS. A similar type formula is also desirable for a precipitous terrain addition. Item remains open. Mr. Chuck Everest, AVN-210, will report at the next meeting. ALPA agreed to provide information to AVN-210 on this item. **ACTION: AVN-210 and ALPA.**

MEETING 95-02: Chuck Everest, AFS-421, reported that developing a specific formula for a precipitous terrain additive is impossible until there is a clear definition of "precipitous

terrain". A strawman definition was presented to the group; however, more development is needed. During the discussion, Tom Young, ALPA, requested that paragraph 323a be revised to reflect that ROC "shall" vice "should" be increased. Chuck stated that this is not possible until a criterion is first established. **ACTION: AFS-421.**

MEETING 96-01: Don Pate, AFS-450, presented a briefing on the FAA's on-going study of this issue. A three-phase program was presented outlining the proposed methodology to resolve the issue. Discussion followed concentrating on the American Airlines accident at Windsor Locks, CT. ALPA also expressed concerns that procedure specialists may not be coordinating sufficiently with air carriers and FBO's when designing approaches. **ACTION: AFS-450.**

MEETING 96-02: Don Pate, AFS-450, presented a briefing on the FAA's on-going study of this issue. During the study, it was discovered that the National Center for Atmospheric Research (NCAR) had developed a computerized program to evaluate weather predictions. This model is adaptable for precipitous terrain modeling; however, the process would be labor intensive and cost approximately \$80K-\$100K per runway. Since there is no FAA funding available, follow on efforts are being coordinated with NASA Ames and the USAF to determine if alternate resources are available to address this issue. In the interim, the current process of soliciting user comments must be continued. ALPA noted that a specific request for a precipitous terrain additive on approaches to runway 15 at Windsor Locks, CT was denied by AVN-100; their rationale being that precipitous terrain additives must be applied to all approaches at a specific airport, not to a single runway. Jim Nixon, AFS-440, took an IOU to research and standardize policy. **ACTION: AFS-440, AFS-450, and AVN-160.**

MEETING 97-01: Don Pate, AFS-450, presented a briefing on the FAA's on-going study of this issue. He noted that the National Center for Atmospheric Research (NCAR) had responded to the FAA's request to develop a general model, with accompanying software, that could be applied to an approach to a specific runway. Certain parameters such as wind and terrain characteristics along the approach would be specified and the model would identify if an adjustment is necessary and the amount of ROC increase needed. The FAA Weather IPT has indicated that, based on current commitments, the project will be added to the 1999 budget. Steve Hickok, HAI, noted that helicopters should be included in the study. Details of Don's briefing are contained in the attached status document. Terry Deplois, AVN-160, briefed the current AVN policy to get user input on precipitous terrain activity in the interim. He also stated that the ROC has been doubled on the VOR/DME RWY 15 IAP at Bradley, CT as a result of the November 1995 American Airlines MD-88 landing accident. The revised IAP is scheduled for publication on May 22. **ACTION: AFS-450.**

MEETING 97-02: Don Pate, AFS-450, reported that funding has been received for the project and a contract is in place for the National for Atmospheric Research (NCAR) to assist AFS-450 in the development of an analytically based geographic definition of precipitous terrain and associated formulas for use by procedure developers to identify

and make appropriate adjustments for precipitous terrain. Don then gave a presentation outlining AFS-450 action to present, and talked to the attached Status Document. AFS-450 will work closely with NCAR to ensure that the terms of contract are adequately addressed to accomplish these goals. NCAR will develop a simple empirical model for determining the required increases in obstacle clearance near precipitous terrain.

ACTION: AFS-450.

MEETING 98-01: Jack Corman, AFS-420, provided an update briefing. AFS-420 is continuing work with the contractor (National Center for Atmospheric Research (NCAR)) in the development of an analytically based geographic definition of precipitous terrain and associated formulas for use by procedure developers to identify and make appropriate adjustments for precipitous terrain. AFS-420 will work closely with NCAR to ensure that the terms of the contract are adequately addressed to accomplish these goals. NCAR will develop a simple empirical model for determining the required increases in obstacle clearance near precipitous terrain. Plans are to present adjustments at the next forum.

ACTION: AFS-420.

MEETING 98-02: A representative of the Oklahoma City section of AFS-420 was unable to attend. Howard Swancy, AFS-420, briefed that AFS-420 has a preliminary model for precipitous terrain evaluation that should be finalized by December 31st. Once finalized, the model will be used for criteria development. **ACTION: AFS-420.**

MEETING 99-01: Howard Swancy, AFS-420, briefed progress on this issue. The OPI is Alan Jones, AFS-420, who was unable to attend the meeting. A Phase I model has been developed and is now undergoing expert analysis to determine the model's efficiency. This model expresses precipitous terrain analytically by evaluating DTED based upon the general concepts of "high enough", "rough enough", and "steep enough". On any flight segment, the primary and secondary areas and an additional buffer area can be evaluated quantitatively for aspects of high, rough and steep. Currently, several programs are being examined to quantify these different aspects of terrain and then determine a threshold value for precipitous terrain ROC adjustments. The sheer volume of data points to be analyzed necessitates computer automation of the process. The National Center for Atmospheric Research (NCAR) will continue working with the FAA over the next several months in developing Phase II and perhaps Phase III models and the software necessary to successfully develop and implement precipitous terrain criteria. AFS-420 will continue tracking the program and report. **ACTION: AFS-420.**

MEETING 99-02: Bill Hammett, AFS-420 (ISI), presented a status update paper prepared by Alan Jones, AFS-420. The first cut of the new trial software produced some memory allocation problems. Therefore, the target development completion date is delayed from March 31st to April 14th. Verification of the software, field trials and refinements are expected to take another six months. Full implementation of the new criteria for straight final and intermediate segments is planned for October. **ACTION: AFS-420.**

MEETING 00-01: Dave Eckles, AFS-420, presented a status update paper prepared by Alan Jones, AFS-420. The first cut of the new trial software produced some memory allocation problems. Therefore, the target development completion date is delayed from March 31st to April 14th. Verification of the software, field trials and refinements are expected to take another six months. Full implementation of the new criteria for straight final and intermediate segments is planned for October. **ACTION: AFS-420.**

MEETING 00-02: Dave Eckles, AFS-420, presented a status update paper prepared by Alan Jones, AFS-420. Software to determine precipitous terrain and the required adjustment is currently being installed on the FAA's Instrument Approach Procedure Automation (IAPA) system. Brad Rush, AVN-160, confirmed that operational testing and evaluation (OTE) would begin later this year. Kevin Comstock, ALPA, requested examples of test results when available. Wally Roberts, ALPA, recommended Medford, OR and Monterey, CA as test sites. Brad agreed to provide examples to ALPA after OTE is complete. **ACTION: AFS-420 and AVN-160.**

MEETING 01-01: An update report from Alan Jones, AFS-420, was not provided. Brad Rush, AVN-160, provided an update on AVN-100 operational testing and evaluation (OTE). The software evaluation of Medford, OR specified a precipitous terrain adjustment of 368'. Now that it has been determined that the software will analyze terrain and provide a recommended adjustment, implementation issues must be addressed; e.g., should the adjustment apply to precision approaches, should the software adjustment always be applied or manual override allowed, how will the impact of higher minima be received by the user community, etc. AFS-420 has a meeting scheduled for May 11 to discuss these issues and will report the results at the next meeting. **ACTION: AFS-420 and AVN-160.**
